

BASF Aktiengesellschaft

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**We claim:-**

1. A pulverulent formaldehyde-free binder composition, especially for fibrous  
5 and/or granular substrates, containing
  - a) a pulverulent copolymer polymerized from maleic anhydride and at least one  $\alpha$ -olefin as component A; and also
  - 10 b) at least one pulverulent crosslinker which has two or more reactive groups capable of reacting with the carbonyl groups of maleic anhydride, as component B; and also
  - c) optionally further additive materials.
- 15 2. A binder composition as claimed in claim 1, wherein the maleic anhydride fraction in the copolymer is up to 50% by weight, based on the copolymer.
- 20 3. A binder composition as claimed in claim 1, wherein the copolymer fraction in the binder composition is in the range from 5% by weight to 95% by weight, preferably in the range from 40% by weight to 90% by weight and especially in the range from 40% by weight to 60% by weight, each percentage being based on the binder composition, and/or the  
25 crosslinker fraction in the binder composition is in the range from 5 to 95% by weight, especially in the range from 10 to 60% by weight and preferably in the range from 40 to 60% by weight, each percentage being based on the binder composition.
- 30 4. A binder composition as claimed in claim 1, wherein the  $\alpha$ -olefin is a C<sub>4</sub>- to C<sub>32</sub>- $\alpha$ -olefins, preferably C<sub>4</sub>- to C<sub>6</sub>- $\alpha$ -olefins, more preferably C<sub>4</sub>- to C<sub>8</sub>- $\alpha$ -olefins and most preferably isobutene and diisobutene.
- 35 5. A binder composition as claimed in claim 1, wherein the crosslinker is selected from the group consisting of polyfunctional alcohols, polyfunctional amines, molecules which contain hydroxyl and/or amino

groups, thiols, hydroxyl-terminated polymers, epoxides, isocyanates, organohalogen compounds, aziridines, carbodiimides, oxazolines, aminosilanes and hydroxylalkylamines.

- 5     6.     A binder composition as claimed in claim 1, wherein the difference between the softening point of the copolymer and the melting or softening point of the crosslinker is generally less than 250°C, preferably less than 200°C and more preferably less than 180°C.
- 10    7.     A binder composition as claimed in claim 1, wherein the storage modulus  $G'$  initially decreases at least once to a value  $\leq 10^8$  Pa, preferably  $\leq 10^7$  Pa and more preferably  $\leq 10^6$  Pa, and then rises again, on heating from 50°C to 300°C, preferably from 50°C to 250°C and more preferably 80°C to 250°C.
- 15    8.     A pulverulent formaldehyde-free binder composition, especially for fibrous and/or granular substrates, containing
- 20           a) a pulverulent copolymer formed from 25 mol% to 50 mol%, based on the copolymer, of maleic anhydride, at least one  $\alpha$ -olefin and/or styrene as component A'; and
- 25           b) at least one pulverulent crosslinker which has two or more reactive groups capable of reacting with the carbonyl groups of maleic anhydride, as component B; and also
- 30           c) optionally further additive materials.
- 35    9.     A binder composition as claimed in claim 8, wherein the copolymer fraction in the binder composition is in the range from 5% by weight to 95% by weight, preferably in the range from 40% by weight to 90% by weight and especially in the range from 40% by weight to 60% by weight, each percentage being based on the binder composition, and/or the crosslinker fraction in the binder composition is in the range from 5 to 95% by weight, especially in the range from 10 to 60% by weight and preferably in the range from 40 to 60% by weight, each percentage being based on the binder composition.

10. A binder composition as claimed in claim 8, wherein the  $\alpha$ -olefin is a C<sub>4</sub>- to C<sub>32</sub>- $\alpha$ -olefins, preferably C<sub>4</sub>- to C<sub>6</sub>- $\alpha$ -olefins, more preferably C<sub>4</sub>- to C<sub>8</sub>- $\alpha$ -olefins and most preferably isobutene and diisobutene.
- 5 11. A binder composition as claimed in claim 8, wherein the crosslinker is selected from the group consisting of polyfunctional alcohols, polyfunctional amines, molecules which contain hydroxyl and/or amino groups, thiols, hydroxyl-terminated polymers, epoxides, isocyanates, organohalogen compounds, aziridines, carbodiimides, oxazolines, aminosilanes and hydroxylalkylamines.  
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12. A binder composition as claimed in claim 8, wherein the difference between the softening point of the copolymer and the melting or softening point of the crosslinker is generally less than 250°C, preferably less than  
15 200°C and more preferably less than 180°C.
13. A binder composition as claimed in claim 8, wherein the storage modulus G' initially decreases at least once to a value  $\leq 10^8$  Pa, preferably  $\leq 10^7$  Pa and more preferably  $\leq 10^6$  Pa, and then rises again, on heating from 50°C to  
20 300°C, preferably from 50°C to 250°C and more preferably 80°C to 250°C.
14. A process for binding fibrous and/or granular substrates, which comprises a pulverulent formaldehyde-free binder composition as claimed in claim 1 being mixed with fibrous and/or granular substrates and binding the latter  
25 preferably by heating in the presence or absence of at least one catalyst.
15. A process as claimed in claim 14, wherein the fibrous and/or granular substrate is selected from the group consisting of rockwool fibers, mineral fibers, glass fibers, wood fibers, hemp fibers, sisal fibers, jute fibers, flax  
30 fibers, textile fibers, wool fibers, cotton fibers, cellulose fibers and synthetic fibers, especially polyester and nylon, wood chips, cork granules, sand, especially core sand for casting molds, aluminum oxides, especially abrasive materials.
- 35 16. A process for binding fibrous and/or granular substrates, which comprises a pulverulent formaldehyde-free binder composition as claimed in claim 8

being mixed with fibrous and/or granular substrates and binding the latter preferably by heating in the presence or absence of at least one catalyst.

- 5 17. A process as claimed in claim 16, wherein the fibrous and/or granular substrate is selected from the group consisting of rockwool fibers, mineral fibers, glass fibers, wood fibers, hemp fibers, sisal fibers, jute fibers, flax fibers, textile fibers, wool fibers, cotton fibers, cellulose fibers and synthetic fibers, especially polyester and nylon, wood chips, cork granules, sand, especially core sand for casting molds, aluminum oxides, especially  
10 abrasive materials.
18. Products, especially shaped articles, obtainable by the process of claim 14.
- 15 19. Products, especially shaped articles, obtainable by the process of claim 16.